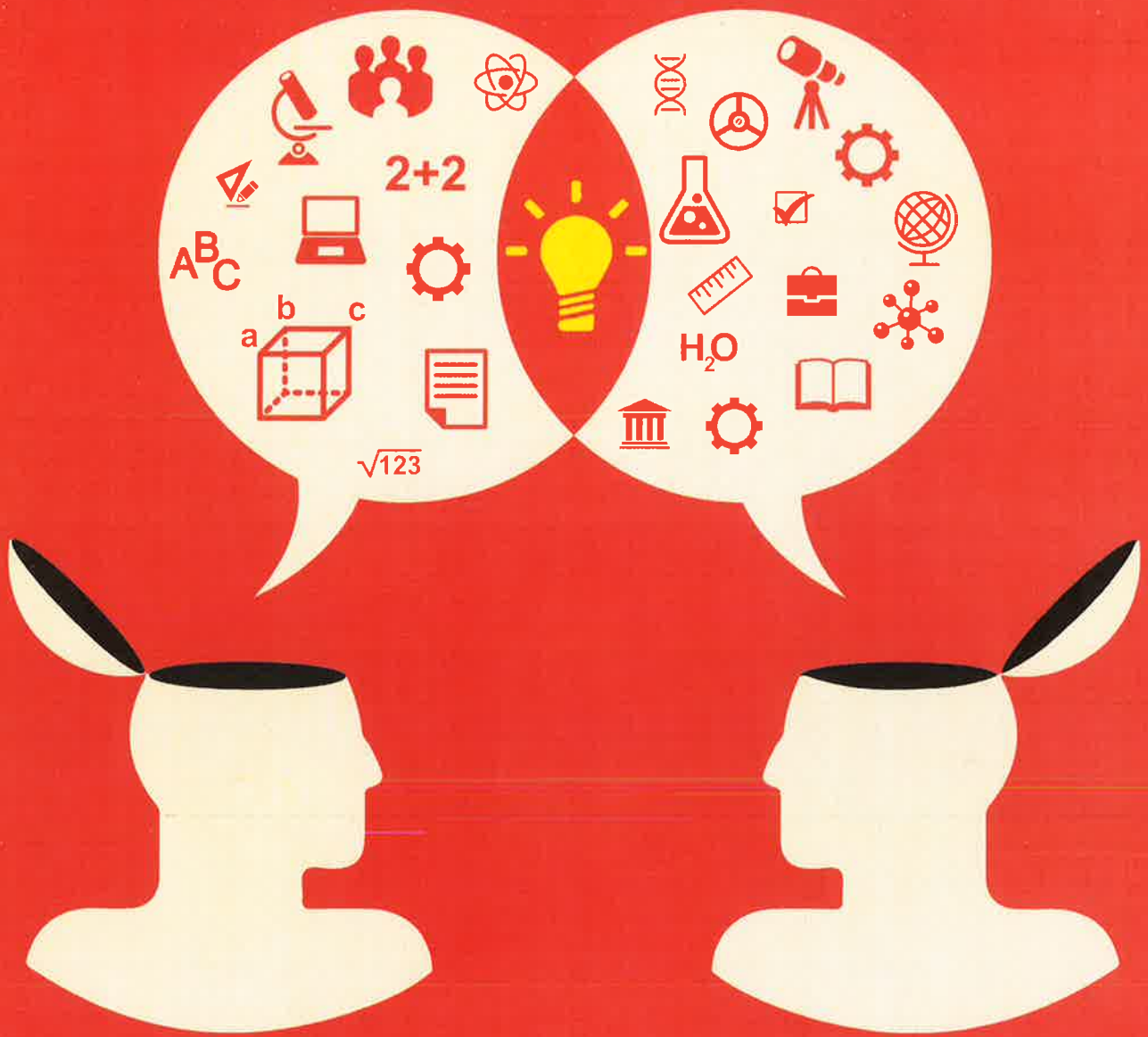
15th FEA research symposium

Faculty of Engineering and Architecture



80. Maarten Vanhoucke (EA19)

STIGglasses: Multi-user wearable open-hardware intuitive video-stream tagging device

Video logging can be a valuable tool for documenting design processes, such as brainstorming sessions, user testing, and prototyping activities. However, the large amount of data captured makes analysis difficult and time consuming. With our STIGglasses, we simultaneously capture first-person view video and biometric data (galvanic skin response) of each agent in a design process. The system consists of a head-mounted video recording device in combination with a wrist-mounted sensor unit. By cross-referencing the biometric data, we can discern key moments in the design process. The time stamps of these key moments are then used to automatically generate a summary video of the process, greatly reducing the laborious analysis process. Design processes captured with the STIGglasses can be intrusively interpreted by other researchers, while simplicity of the devices keeps the interactions limited.

81. Tim Verbrugghe, Andreas Kortenhaus and Julien De Rouck (EA15)

Wave Energy, Charge your Phone with Ocean Power

Wave energy from ocean waves is absorbed using Wave Energy Converters (WECs). A specific type of WEC is the point-absorber. They are floating bodies, connected to the seabed or a moored platform. The oscillatory motion of point-absorbers can be transformed into usable electricity. The component responsible for this conversion is called the power take-off system (PTO).

The main goal of the research is to focus on a hydraulic power take-off concept, with promising theoretical results. The heaving motion of the buoy is transferred to a hydraulic plunger, using a cable system. During the upward buoy motion, the plunger is pushed into a cylinder and hydraulic oil is accelerated. The cyclic flow rates are damped by an accumulator. A more continuous flow drives a hydromotor, connected to an electric generator.

During the research, a scale model of this PTO will be built. Several lab and wave flume tests will be conducted to study the power generation and conversion efficiency.

82. Thibault Verhoeven, Pieter Buteneers, Benjamin Schrauwen and Pieter-Jan Kindermans (EA06)

An Unsupervised Plug and Play BCI with Consumer Grade Hardware

Brain-computer interfaces (BCIs) are systems establishing a direct link from brain to machine. As such they give the ability to control a computer solely by means of your brain signals. The P300 speller for example is a BCI for spelling text. It makes use of Event- Related Potentials in the brain to distinguish the target from a grid of characters presented to the user. In this way, character per character, a sentence can be spelled. As the handled brain signals differ a lot among users, a tedious and time consuming calibration of the system is needed. In this work we use an unsupervised machine learning technique to eliminate the need for this calibration and as such construct a plug and play BCI that is able to give a decent spelling accuracy even